

FILE A - For Optional Classroom Use

Science and Technology:

Released Items A-2

Social Studies:

Released Items A-17

Mathematics:

Released Items A-31

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Science and Technology

Released Items

1. If there were a significant decrease in the amount of ozone in the atmosphere, which health condition would likely increase?

☐ A. brain tumors
☐ B. skin cancer
☐ C. ulcers
☐ D. flu

2. Which statement is true of reproduction for both humans and frogs?

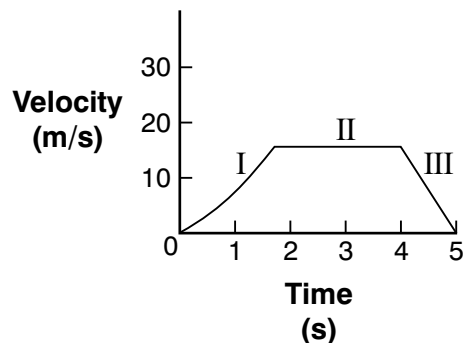
☐ A. The egg cells are about the same size as the sperm cells.
☐ B. The egg and sperm cells unite inside adult females.
☐ C. Males produce many sperm cells.
☐ D. Females produce one egg a month.

3. Which advantage does the Hubble Space Telescope have over the best land-based telescope?

☐ A. detail of image
☐ B. cost of operation
☐ C. size of lens
☐ D. ease of repair

Use the information and graph below to answer question 4.

Newton's second law states that a net force acting on an object causes the object to accelerate in the direction of the force. Acceleration is the rate of change of velocity.



4. During which interval was a net force acting on the object?

☐ A. interval I only
☐ B. interval II only
☐ C. intervals I and II only
☐ D. intervals I and III only

Use the table below to answer question 5.

	Carbon-14 Source beta radiation (counts per minute)	Cesium-137 Source beta and gamma radiation (counts per minute)
no protection	1279	1458
aluminum shield	407	1325
cotton fabric shield	1050	1439
glass shield	357	1299
plastic shield	1159	1449

5. Which material listed in the table appears to give the **most** protection from radiation?

- ☐ A. aluminum
☐ B. cotton fabric
☐ C. glass
☐ D. plastic

Use the periodic table below to answer question 6.

<div> <div>1 H 1.008</div> <div>3 Li 6.94</div> <div>4 Be 9.01</div> <div>11 Na 22.99</div> <div>12 Mg 24.31</div> <div>19 K 39.10</div> <div>20 Ca 40.08</div> <div>21 Sc 44.96</div> <div>22 Ti 47.90</div> <div>23 V 50.94</div> <div>24 Cr 52.00</div> <div>25 Mn 54.94</div> <div>26 Fe 55.85</div> <div>27 Co 58.93</div> <div>28 Ni 58.70</div> <div>29 Cu 63.55</div> <div>30 Zn 65.38</div> <div>31 Ga 69.72</div> <div>32 Ge 72.59</div> <div>33 As 74.92</div> <div>34 Se 78.96</div> <div>35 Br 79.90</div> <div>36 Kr 83.80</div> <div>37 Rb 85.47</div> <div>38 Sr 87.62</div> <div>39 Y 88.91</div> <div>40 Zr 91.22</div> <div>41 Nb 92.91</div> <div>42 Mo 95.94</div> <div>43 Tc (97)</div> <div>44 Ru 101.07</div> <div>45 Rh 102.91</div> <div>46 Pd 106.4</div> <div>47 Ag 107.87</div> <div>48 Cd 112.41</div> <div>49 In 114.82</div> <div>50 Sn 118.69</div> <div>51 Sb 121.75</div> <div>52 Te 127.60</div> <div>53 I 126.90</div> <div>54 Xe 131.30</div> <div>55 Cs 132.91</div> <div>56 Ba 137.33</div> <div>57 *La 138.91</div> <div>72 Hf 178.49</div> <div>73 Ta 180.95</div> <div>74 W 183.85</div> <div>75 Re 186.21</div> <div>76 Os 190.2</div> <div>77 Ir 192.22</div> <div>78 Pt 195.09</div> <div>79 Au 196.97</div> <div>80 Hg 200.59</div> <div>81 Tl 204.37</div> <div>82 Pb 207.2</div> <div>83 Bi 208.98</div> <div>84 Po (209)</div> <div>85 At (210)</div> <div>86 Rn (222)</div> <div>87 Fr (223)</div> <div>88 Ra 226.03</div> <div>89 **Ac (227)</div> <div>104 Unq (261)</div> <div>105 Unp (262)</div> <div>106 Unh (263)</div> <div>107 Uns (262)</div> </div>																<div> <div>2 He 4.003</div> <div>5 B 10.81</div> <div>6 C 12.01</div> <div>7 N 14.01</div> <div>8 O 16.00</div> <div>9 F 19.00</div> <div>10 Ne 20.18</div> <div>13 Al 26.98</div> <div>14 Si 28.09</div> <div>15 P 30.97</div> <div>16 S 32.06</div> <div>17 Cl 35.45</div> <div>18 Ar 39.95</div> </div>	
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6. Which gas is the **least** chemically reactive?

- ☐ A. hydrogen
☐ B. nitrogen
☐ C. neon
☐ D. chlorine

7. If scientists wish to know whether two organisms are closely related, which molecules from each organism would they analyze for similarities?

- ☐ A. fats
- ☐ B. proteins
- ☐ C. starches
- ☐ D. sugars

8. During an experiment, a scientist used petri dishes, nutrient agar, stains, and a light microscope. The scientist was **most likely** studying

- ☐ A. bacteria.
- ☐ B. amoebas.
- ☐ C. earthworms.
- ☐ D. viruses.

9. Light-years are usually used as the unit of measure for the distance between Earth and

- ☐ A. the Moon.
- ☐ B. the Sun.
- ☐ C. a comet.
- ☐ D. a nebula.

10. If a rigid sealed container of gas is heated, can a prediction be made as to what will happen to its pressure?

- ☐ A. Yes, the pressure decreases.
- ☐ B. Yes, the pressure remains the same.
- ☐ C. Yes, the pressure increases.
- ☐ D. No, there is not enough information given.

Use the information and table below to answer question 11.

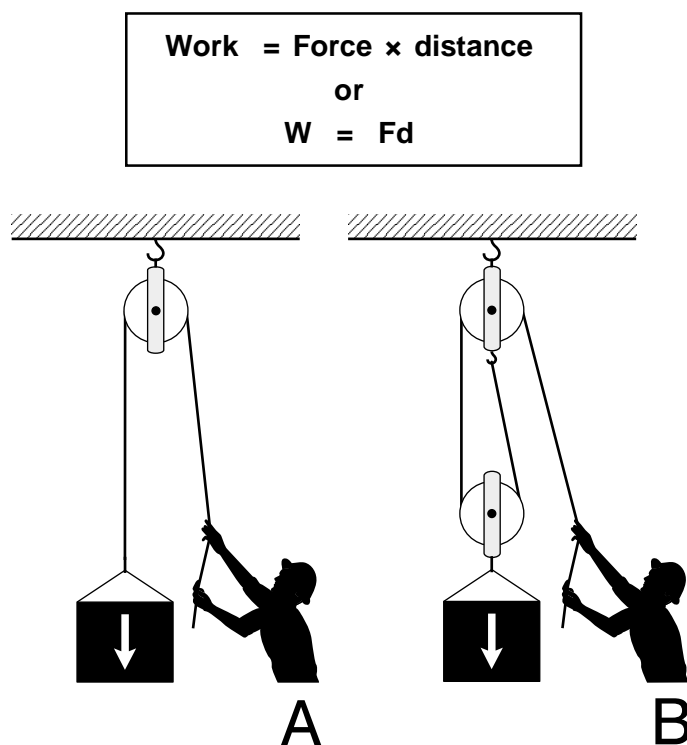
A student investigated the respiratory requirements of yeast cells. She set up four beakers with the contents shown in the table.

Beaker	Contents
A	10 mL yeast suspension 10 mL glucose solution 10 mL distilled water
B	10 mL yeast suspension 10 mL glucose solution 10 mL magnesium sulfate
C	10 mL yeast suspension 20 mL distilled water
D	10 mL yeast suspension 10 mL glucose solution 10 mL sodium fluoride solution

11. Which beaker was the control or standard for comparing the experimental effects in this investigation?

- ☐ A. Beaker A
- ☐ B. Beaker B
- ☐ C. Beaker C
- ☐ D. Beaker D

Use the diagram below to answer question 12.

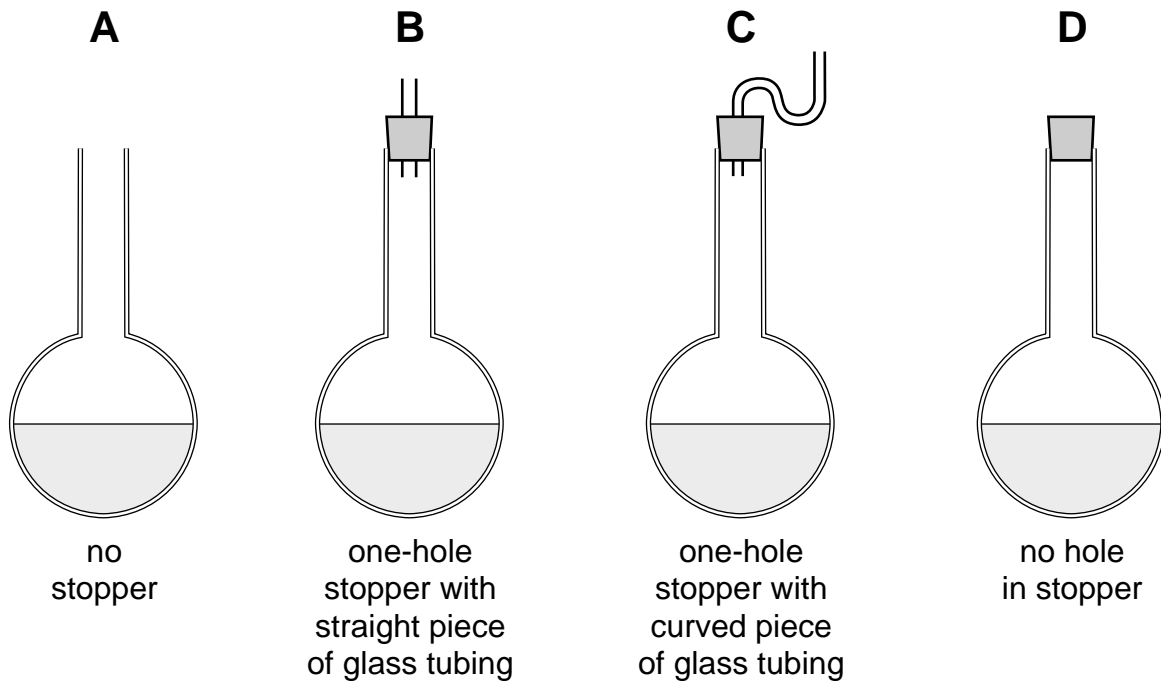


12. To lift the block 5 m, which person applies more force and by how much?

- ☐ A. person A, by twice as much
- ☐ B. person B, by twice as much
- ☐ C. person A, by four times as much
- ☐ D. person B, by four times as much

Use the information and diagrams below to answer question 13.

In the 1500s many people believed in spontaneous generation, the idea that living things can arise from nonliving things. Suppose a person who believed in spontaneous generation conducted an experiment to collect evidence to support this idea. The person took four flasks, placed 50 mL of nutrient broth in each flask, and then sterilized the flasks and broth. The stoppers on the four flasks were varied. After three days, the person analyzed the contents of the flasks.

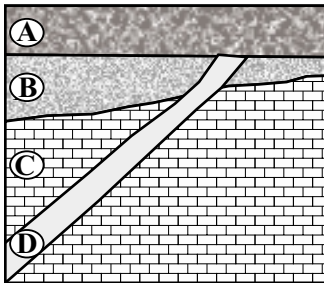


13. The presence of microorganisms in which flask would **best** demonstrate that spontaneous generation had occurred?
- ☐ A. flask A
 - ☐ B. flask B
 - ☐ C. flask C
 - ☐ D. flask D

14. Earth crustal movements are caused by convection currents in the mantle. Which theory best explains the changing face of Earth?

- ☐ A. evolution
- ☐ B. plate tectonics
- ☐ C. big bang
- ☐ D. relativity

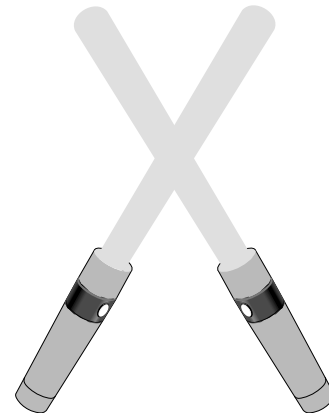
Use the diagram below to answer question 15.



15. Which layer of rock is the oldest?

- ☐ A. layer A
- ☐ B. layer B
- ☐ C. layer C
- ☐ D. layer D

Use the diagram below to answer question 16.



16. This diagram shows that the beams of light from two flashlights can pass through each other and then continue on unaffected. This observation illustrates which property or properties of light?

- ☐ A. only particle
- ☐ B. only wave
- ☐ C. both particle and wave
- ☐ D. neither particle nor wave

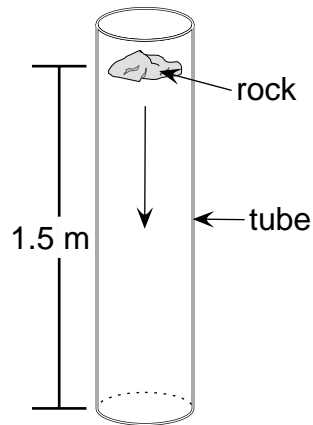
Use the information below to answer question 17.

Planaria are black flatworms that live in water. When exposed to light, they swim away from it.

17. State and explain a possible adaptive function for this behavior of Planaria.

17.

Use the information below to answer question 18.



Inside this vertical tube is a vacuum. A rock is dropped from the top of the tube. The table shows what the potential energy and kinetic energy of the rock are at various heights.

Height (meters)	Potential Energy (joules)	Kinetic Energy (joules)
1.5	10.3	0
1.2	8.2	2.1
0.8	5.5	4.8
0.4	2.7	7.6

18. Describe the relationship between the potential energy and the kinetic energy of the rock.

18.

Use the table below to answer question 19.

Substances	Normal Levels (in parts per million at 20°C)	Indication of Pollution
oxygen	9.0	Low level suggests sewage pollution.
calcium and magnesium	60.0	High level suggests industrial pollution.
nitrogen (nitrates and ammonia)	0.20	High level suggests sewage or farm runoff pollution.
phosphorus (phosphates)	0.01	High level suggests sewage or farm runoff pollution.

19. A sample from a river was analyzed and found to have the following amounts of each of these substances.

oxygen	9.2 ppm
calcium and magnesium	58.9 ppm
nitrogen	0.21 ppm
phosphorus	0.01 ppm

- What conclusion can be drawn about whether this water sample is polluted?
- Explain your answer to part a.

19.

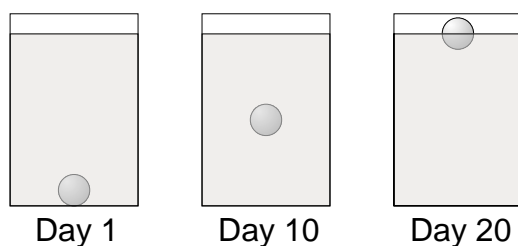
20. Give **two** ways the concentration of salt in the ocean can decrease.

20.

21. An object is traveling 3 m/s west. If there were absolutely no forces acting on this object, describe its motion during the next two seconds.

21.

Use the diagram below to answer question 22.



22. A student places some table salt into a cylinder of water and drops an object into the cylinder. It sinks. After 20 days the student observes that the object is floating.
- Give a hypothesis that explains this change.
 - Design an experiment to test the hypothesis. Include a description of the procedure you would use and what data you would collect. Explain how the data would help you decide if the hypothesis is correct or not.

22.

- [illegible]

24. a. Describe nuclear fission. Include an explanation of where the energy released comes from.
- b. Discuss **one** positive impact from its use.
- c. Discuss **one** negative impact from its use.

24.

25. How many species of human beings are there today?

- ☐ A. 1
- ☐ B. 3
- ☐ C. 5
- ☐ D. 7

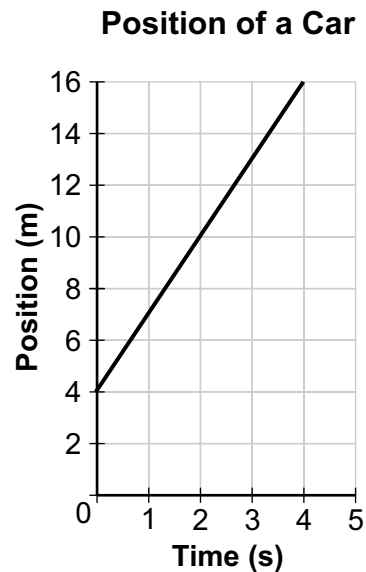
26. Bacteria are classified as prokaryotes. How are prokaryotes different from all other organisms?

- ☐ A. They consist of many cells.
- ☐ B. They have cell walls.
- ☐ C. They reproduce asexually.
- ☐ D. They do not have nuclear membranes.

27. Which is a function of the Golgi apparatus in a cell?

- ☐ A. breaking down food particles
- ☐ B. packaging and secreting products
- ☐ C. releasing energy
- ☐ D. making proteins

Use the graph below to answer question 28.



28. This graph shows the position of a moving car with respect to a wall that is located at 0 m. The car's speed was

- ☐ A. 0.25 m/s.
- ☐ B. 1.0 m/s.
- ☐ C. 3.0 m/s.
- ☐ D. 4.0 m/s.

40. Describe **four** ways that the processes of photosynthesis and cellular respiration are alike.

40.

41. A high school science textbook published in 1987 defined quasars as “galaxies that emit radio waves.” Imagine that you are interested in learning more about what causes quasars and especially in obtaining more up-to-date information about quasars. Describe **four** different sources of information you could consult. At least two sources you describe should provide more up-to-date information than the textbook.

41.

Social Studies

Released Items

1. Which statement **best** describes the effects of technology in the last fifty years?
 - ☐ A. Technology has eliminated famine and disease.
 - ☐ B. Technology has made it hard for non-Western nations to develop economically.
 - ☐ C. Technology has led to limited trade between most countries.
 - ☐ D. Technology has accelerated the mixing of different cultures.
2. Which statement is true about labor unions in the United States in the late 1800s?
 - ☐ A. Labor unions encountered opposition from both business and government.
 - ☐ B. The majority of farmworkers belonged to labor unions.
 - ☐ C. The federal government actively supported labor unions' right to strike.
 - ☐ D. Intervention by business leaders destroyed the labor unions.
3. Which of the following is the **most likely** reason people in the United States have opposed closer economic and diplomatic ties with the People's Republic of China?
 - ☐ A. China's failure to repay its war debts
 - ☐ B. concerns about upsetting Chinese American citizens
 - ☐ C. human rights abuses in China
 - ☐ D. fears about antagonizing South Korea and Japan
4. The culture of one group of people can spread, influencing other areas of the world. Think about the development of central California in the last half of the 1800s. Which culture had the **least** influence on central California?
 - ☐ A. eastern Asia
 - ☐ B. Mexico
 - ☐ C. eastern United States
 - ☐ D. France
5. There are three ways governments can restrict foreign imports: tariffs, embargoes, and quotas. What is the **most likely** effect of these restrictions on imported products?
 - ☐ A. The price consumers pay for the product will rise.
 - ☐ B. The price consumers pay for the product will lower.
 - ☐ C. The supply of the product will increase.
 - ☐ D. The demand for the product will increase.

Use the list below of technological advances from United States history to answer question 6.

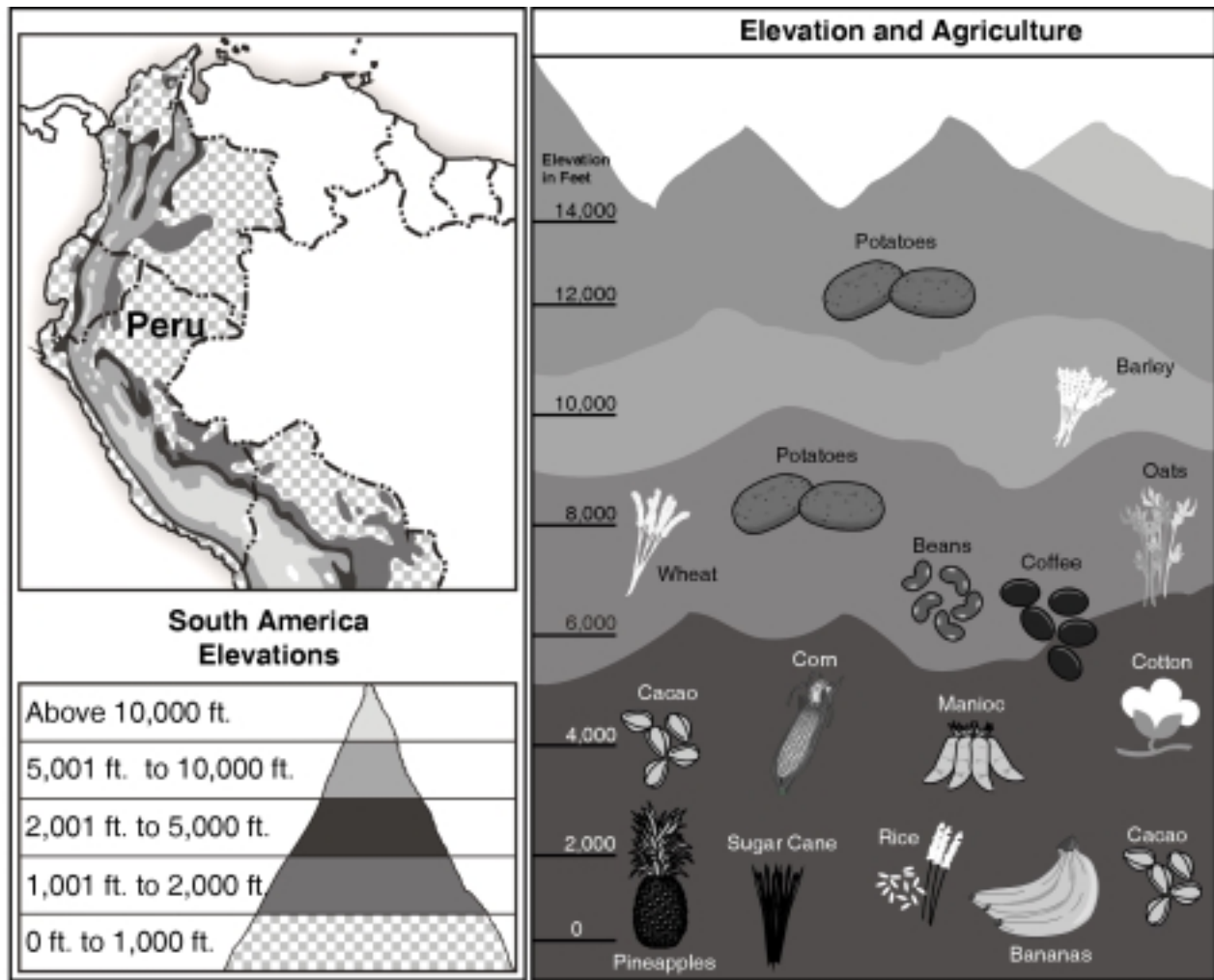
1. first message sent by telegraph
 2. first machines powered by electricity
 3. first textile mills established
 4. first railroads built
6. Which list gives these technological advances in correct chronological order?
- ☐ A. 4, 3, 2, 1
 - ☐ B. 2, 1, 3, 4
 - ☐ C. 3, 4, 1, 2
 - ☐ D. 1, 2, 3, 4
7. Three basic kinds of economic systems are traditional, command, and market. Currently Cuba has a command economy. Which of the following is an advantage consumers usually have in a command economy?
- ☐ A. Prices drop when the supply of goods becomes scarcer.
 - ☐ B. Prices remain stable regardless of changes in supply and demand.
 - ☐ C. The government allows businesses to do what they want.
 - ☐ D. The government makes sure that there are plenty of consumer goods for everyone.
8. Which of the following is a sole power that only the House of Representatives has?
- ☐ A. deciding if laws are constitutional
 - ☐ B. approving foreign treaties
 - ☐ C. bringing charges of impeachment
 - ☐ D. passing the annual government budget

The following passage is taken from an 1892 political party platform. Read it and then answer question 9.

Corruption dominates the ballot-box, the Legislatures, the Congress . . . The newspapers are largely subsidized or muzzled, public opinion silenced, business prostrated, homes covered with mortgages, labor impoverished, and the land concentrating in the hands of the capitalists . . . We demand free and unlimited coinage of silver and gold . . . We demand a graduated income tax . . . the government should own and operate the railroads in the interest of the people . . .

9. Which reform party issued this statement?
- ☐ A. Federalists
 - ☐ B. Populists
 - ☐ C. Know-Nothings
 - ☐ D. Whigs
10. A country's culture includes its religion, language, and ethnicity. Which of the following countries has the **least** cultural diversity?
- ☐ A. Brazil
 - ☐ B. India
 - ☐ C. Saudi Arabia
 - ☐ D. United States

Use the map and chart below to answer question 11.



11. If the United States government decides to provide agricultural aid to farmers who live in the mountains of Peru, what crops should the government recommend that the farmers grow?
- ☐ A. beans and bananas
 - ☐ B. barley and wheat
 - ☐ C. wheat and rice
 - ☐ D. sugarcane and pineapples

Use this quotation from the “Declaration of Conscience,” written by Maine senator Margaret Chase Smith in June 1950, to answer question 12.

“Those of us who shout the loudest about Americanism in making character assassinations are all too frequently those who . . . ignore some of the basic principles of Americanism—the right to criticize; the right to hold unpopular beliefs; the right to protest; the right of independent thought. The exercise of these rights should not cost one single American his reputation or his right to a livelihood . . .”

12. Senator Smith’s statement was in response to

- ☐ A. criticism of protesters against the Vietnam War.
- ☐ B. Senator Joseph McCarthy’s campaign against Communism.
- ☐ C. the trial of Ethel and Julius Rosenberg for treason.
- ☐ D. persecution of advocates for civil rights in the South.

13. Many important government principles or practices were established in the American colonies before the Revolution. Which principle or practice did **not** come until after the Revolution?

- ☐ A. division between church and state
- ☐ B. separation of powers
- ☐ C. representative government
- ☐ D. private ownership of land

14. In economics, factors of production include natural resources, labor, capital, and entrepreneurship. Which of the following is an example of **capital**?

- ☐ A. raw materials
- ☐ B. manufacturing equipment
- ☐ C. technological knowledge
- ☐ D. undeveloped land

15. One similarity among the French Revolution (1789), the Bolshevik Revolution (1917), and the Chinese Revolution (1949) is that they all

- ☐ A. led to the immediate formation of a democratic government.
- ☐ B. were actively encouraged by the U.S. government.
- ☐ C. were followed by a form of dictatorship.
- ☐ D. depended upon foreign support for success.

Read the following statements to answer question 16.

- In 1279 the Mongol armies of Kublai Khan, grandson of Genghis Khan, completed the conquest of China.
- In 1644 Manchus took over Beijing and ruled China for 260 years.

16. Which statement best describes China during the two periods described above?

- ☐ A. There was little foreign trade or contact with foreign cultures.
- ☐ B. Foreign dynasties controlled the government.
- ☐ C. The country was divided into warring feudal states.
- ☐ D. Power was concentrated in the hands of the shogun.

17. In 1791, the first ten amendments to the United States Constitution were approved. These have become known as the Bill of Rights. Identify **three** rights of citizens that are protected by the first ten amendments.

17.

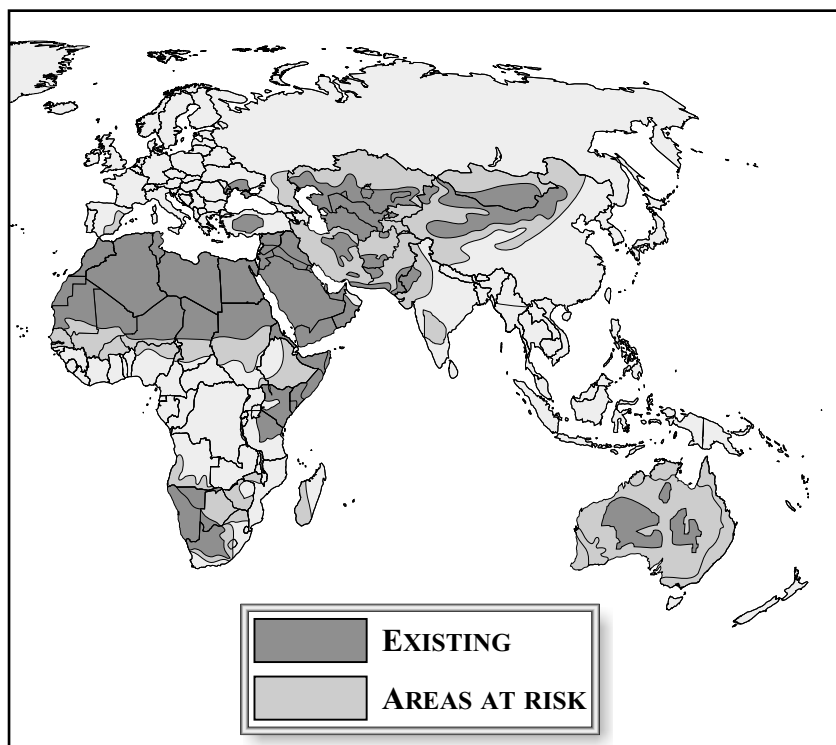
Use the map below to answer question 18.



18. What political characteristic is shared by the shaded countries on this map?

18.

19. The map below identifies an existing physical geographic feature and areas surrounded by that feature.



- Identify the existing physical geographic feature shown on the map.
- Briefly describe why the surrounding areas are also at risk.

19.

Use the information below to answer question 20.

In the new global economy, many countries have moved away from protectionism and toward free trade. There are no tariffs or limits on exports and imports between countries that have agreed to free trade. Recently the United States, Canada, and Mexico signed NAFTA, the North American Free Trade Agreement.

20. Identify and describe **one** effect/result that the NAFTA treaty has had on the United States economy.

20.

Use the passage below to answer question 21.

Without [the Supreme Court] the Constitution would be a dead letter: the executive [branch] appeals to them [the Supreme Court] for assistance against the encroachments of the legislative power, the legislature demands their [the Supreme Court] protection against the assaults of the executive; . . .

21. a. In this passage, what branch of the government does the writer feel is important?
b. What basic principle of our constitutional government is being described in the passage?

21.

22. You are a member of the U.S. House of Representatives representing a district that includes a large city. A new mall is being proposed for this city; the construction of this mall will require large quantities of structural steel. Japan can provide steel at a cost of 15% less than U.S. manufacturers, reducing the cost of building the mall.

A representative from a neighboring district comes to your office; her district includes a steel mill that employs local workers who often shop in the city in your district. She asks you to vote for a 15% tariff on imported steel to protect jobs in her district. The tariff bill is on tomorrow's schedule so you must decide now whether or not you support the tariff.

- a. Describe one advantage of voting for the 15% tariff on imported steel.
- b. Describe one advantage of voting against the 15% tariff on imported steel.
- c. Write a statement that tells how you will vote on the tariff **and** explains your reasons why.

22.

23. John D. Rockefeller, founder of the Standard Oil Company, gained control of the entire oil industry through various business tactics. Ida M. Tarbell wrote critical accounts of the business methods of the Standard Oil Company. The following statements present opposing views about the business practices of nineteenth-century American business leaders.

"I ascribe the success of the Standard Oil Company to its . . . policy of making the volume of its business large enough through the merit and cheapness of its products . . ."

John D. Rockefeller

". . . We are a commercial people, . . . business success is sanctified, and practically any methods which achieve it are justified, . . . 'It's business' has come to be a legitimate excuse for hard dealing, sly tricks, and special privileges."

Ida M. Tarbell

- a. Describe what Rockefeller said to defend Standard Oil Company.
- b. Describe what Tarbell said to criticize Standard Oil Company.
- c. Choose the strongest point of view and explain why it is the strongest. Be sure to include historical details in your explanation.

23.

Read the description of the United States Constitution to answer question 24.

“The Sun (the federal government) would be the main body . . . around which planets (the states) would revolve. The Sun would be supreme over all, and each planet supreme in its own orbit.”

John Dickinson of Delaware

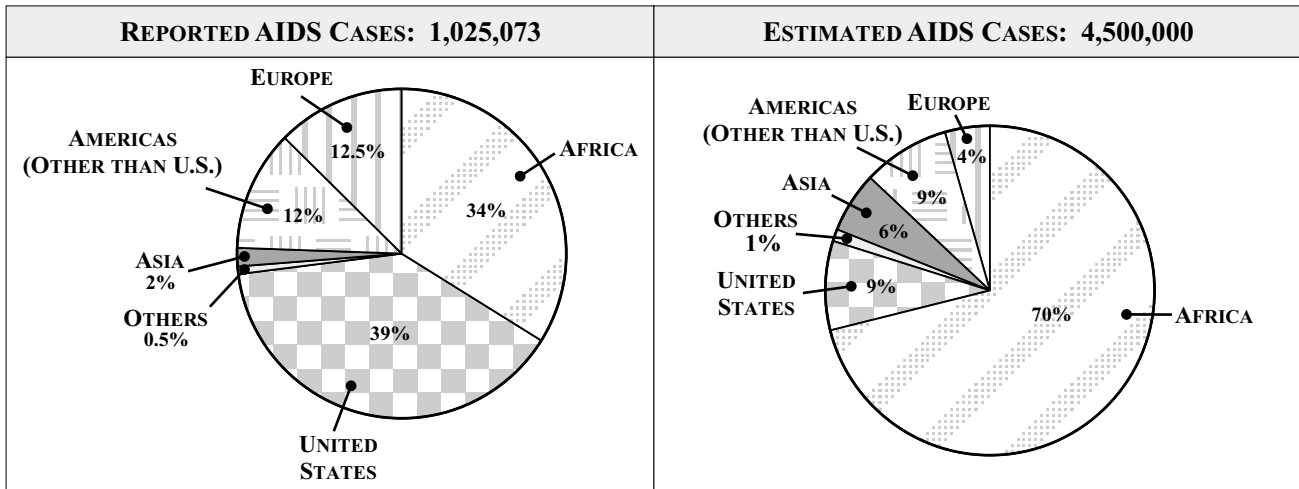
24. The federal system has been the basis for our government for over two hundred years.

- a. Explain what a federal system of government is.
- b. Explain **one** advantage of the federal system.
- c. Explain **one** disadvantage of the federal system.

24.

25. The two graphs below compare the number of reported AIDS cases to the number of estimated AIDS cases in one year.

AIDS AROUND THE WORLD



Which conclusion is supported by the information provided by these graphs?

- ☐ A. AIDS will not be a problem for developed countries in the future.
 - ☐ B. Half of the AIDS cases in Africa are not reported.
 - ☐ C. AIDS is spreading from developed to developing countries.
 - ☐ D. Most of the AIDS cases are found in Europe.
-
26. Any treaty negotiated between the United States and another nation must be ratified by

 - ☐ A. the president's Cabinet.
 - ☐ B. a majority of Congress.
 - ☐ C. the Supreme Court.
 - ☐ D. two-thirds of the Senate.

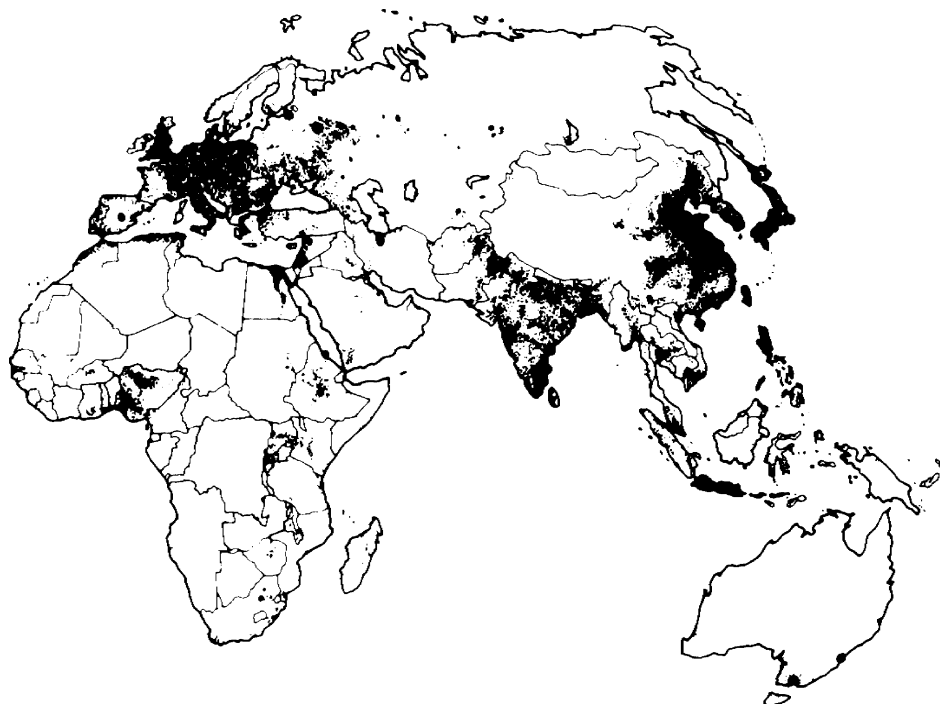
27. An advocate of capitalism would argue that the best means to achieve the distribution of scarce goods and services would be through

 - ☐ A. the forces of supply and demand.
 - ☐ B. government regulation.
 - ☐ C. the policies of business leaders.
 - ☐ D. voluntary rationing.

28. Which is one way amendments to the U.S. Constitution are ratified (approved)?

 - ☐ A. if the president agrees to ratify the amendment by signing it
 - ☐ B. if three-fourths of the legislatures of the states ratify the amendment
 - ☐ C. by approval of a majority of the Supreme Court
 - ☐ D. by approval of two-thirds of the Senate

Use the map below to answer question 40.



40. The dots and shadings on this map indicate areas with high population concentrations.
- Identify **three** countries that have a very high population concentration.
 - Choose **one** country you identified in part a. Fully explain **three** effects this population concentration has on the environment of the country or the area around it.

40.

Study the cartoon below to answer question 41.



41. a. Describe the setting (time and place) that the cartoon is portraying.
b. Explain why the countries are grouped in the manner shown in the cartoon.

41.

Mathematics

Released Items

1. Mr. Willie put items costing the following amounts into his grocery cart.

\$6.99 \$2.36 \$0.46 \$11.63 \$3.97 \$0.52
 \$2.23 \$1.32 \$6.25 \$2.49 \$14.29 \$2.76

Which of the following is the best estimate of the total price of these items?

- ☐ A. between \$30 and \$40
☐ B. between \$40 and \$50
☐ C. between \$50 and \$60
☐ D. between \$60 and \$70

2. Which of the following is the best estimate of the sum of $\sqrt{26} + \sqrt{78}$?

- ☐ A. 10
☐ B. 14
☐ C. 52
☐ D. 104

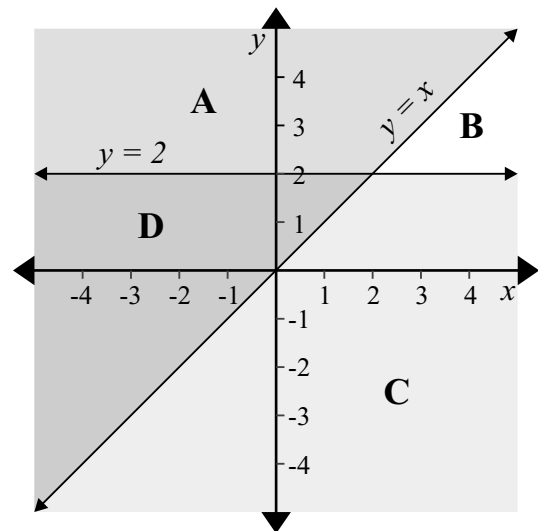
3. Monthly sales in February at Getco, Inc., were down 10% from January's sales. Monthly sales in March were up 10% over February's. How did sales in March compare with sales in January?

- ☐ A. Sales in March were higher.
☐ B. Sales in March were lower.
☐ C. Sales were the same in March and January.
☐ D. Not enough information is given to tell.

4. Three business partners, Mr. Gray, Ms. Peterson, and Mr. Wu, share profits in the ratio of 2:3:5, respectively. Which of the following is the best estimate of Ms. Peterson's share of a profit of \$24,925?

- ☐ A. \$ 7,500
☐ B. \$ 8,300
☐ C. \$10,300
☐ D. \$12,500

Use the graph below to answer question 5.



5. Which region of the graph represents the common solution set for both of the following inequalities?

$$y \geq x$$

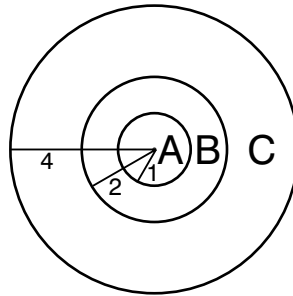
$$y \leq 2$$

- ☐ A. region A
☐ B. region B
☐ C. region C
☐ D. region D

9. a. Find and write a real number between $\frac{5}{8}$ and $\frac{7}{9}$.
b. Is it possible to find a real number between **any** two different real numbers? Justify your answer mathematically.

9.

10. Jennifer is designing a target game to play on the computer. Her target has three concentric circles with radii of lengths in the ratios of 1 to 2 to 4.



If a dot randomly generated by the computer lands within the target area, what is the probability that it will land in the area marked **A**? Show or describe how you found your answer.

10.

11. The annual salaries of the employees of a small company are given below.

President: \$120,000

Vice President: \$75,000

Senior Professionals: \$55,000, \$52,000, \$52,000, \$52,000

Junior Professionals: \$42,000, \$42,000, \$40,000, \$39,000

Clerical Staff: \$25,000, \$20,000, \$19,000

The statistical values for this data set are as follows:

- mean: \$48,692
- median: \$42,000
- mode: \$52,000

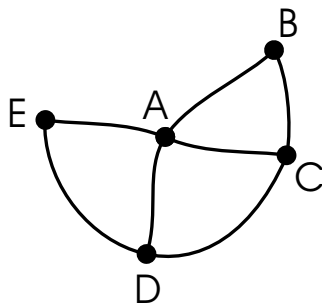
If all three of these values are calculated again **without** the president's salary, which of the values—mean, median, or mode—would change the most? Justify your answer by comparing the effect of this change on all three statistics.

11.

12. Clem's balloon is 200 feet off the ground and rising at a rate of 5 feet per second. Mary's balloon is 100 feet off the ground and rising at a rate of 9 feet per second. In how many seconds will the two balloons be at the same height? Show how you found your answer.

12.

Use the network below to answer question 13.



13. This network represents routes between cities on a map.

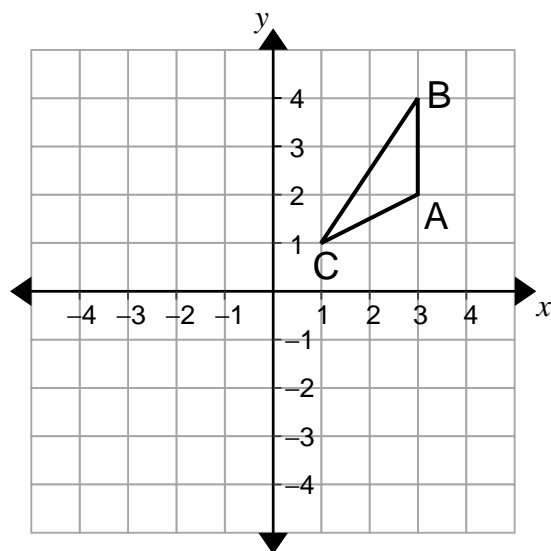
- a. Start at city C and find a route that would allow you to
- drive over every route **exactly once** and
 - visit each city **at least** once.

Record the route in your Student Response Booklet by listing the letters of the cities along your route in order.

- b. Starting at city E, can you find a route that meets the same conditions as in part a? If so, record the route. If not, explain why not.

13.

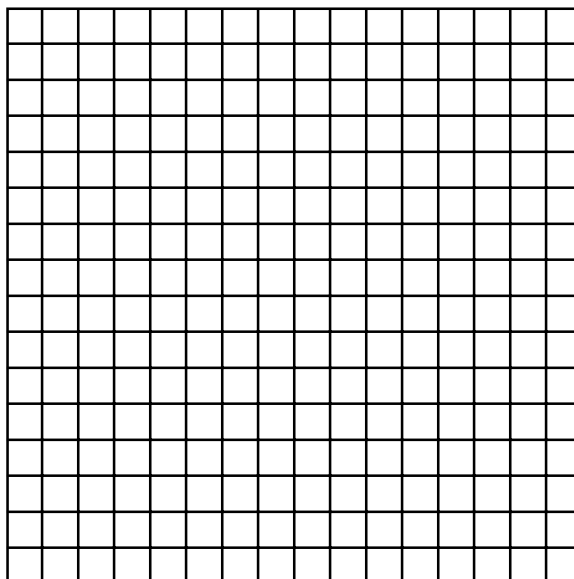
Use the graph below to answer question 16.



16. Copy the triangle above onto the grid below.

- Draw the reflection of $\triangle ABC$ over the x -axis. Name the image you drew $\triangle A'B'C'$.
- Draw the image of $\triangle A'B'C'$ rotated 180° counterclockwise around the origin. Name the image you drew $\triangle A''B''C''$.
- Suppose point P on the interior of $\triangle ABC$ had the coordinates (p,q) . What would the coordinates of point P'' , the image of point P , be after the translations described in parts a and b?

16.



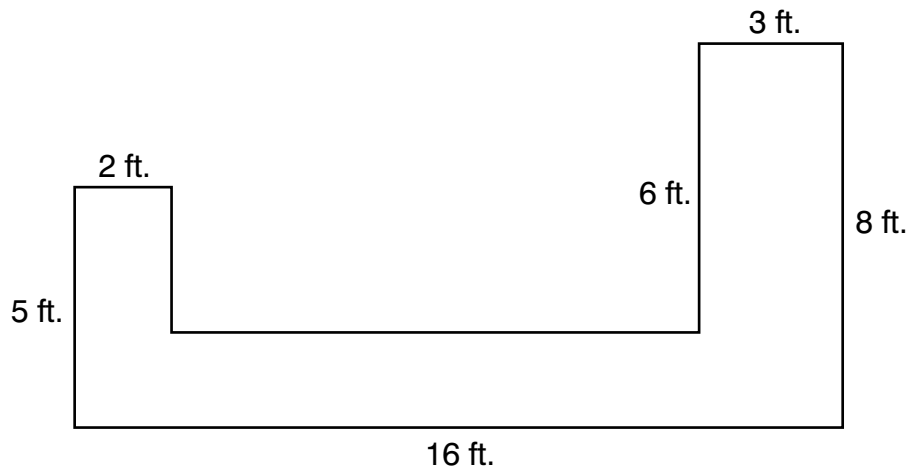
17. Carl needed to rent a car for one week. He collected the following information.

- Hillbrook Car Rentals charges \$230/week plus 20¢ per mile.
- Bridge Car Rentals charges \$210/week plus 25¢ per mile.

- a. Write an equation for the cost, c , to rent from Hillbrook Car Rentals if Carl drives the car x miles.
- b. Write an equation for the cost, c , to rent from Bridge Car Rentals if Carl drives the car x miles.
- c. For what number of miles will it cost the same to rent a car from the two companies? Show or explain how you found your answer.

17.

Use the diagram below to answer question 19.



19. Mr. Rilke is covering the floor of the hallway shown above with 1-foot square tiles. (All angles in the diagram are right angles.) How many tiles will he need?

- ☐ A. 50
- ☐ B. 55
- ☐ C. 56
- ☐ D. 66

20. Three planets are in orbit around their sun. One planet's orbit takes 4 Earth years, another takes 36 Earth years, and the third takes 42 Earth years. If all three planets align at one position in their orbits this year, in how many Earth years will they **next** align in the same position?

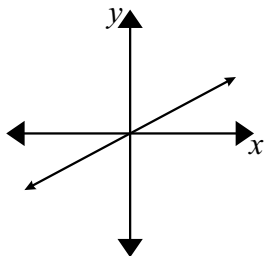
- ☐ A. 168
- ☐ B. 252
- ☐ C. 1,512
- ☐ D. 6,048

21. Jim calculated that a job will take 1.9 hours. If he starts the job at 12:04 P.M., at what time should it be completed?

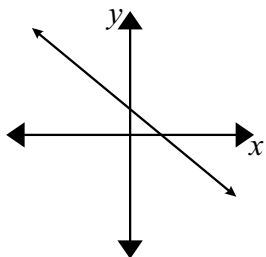
- ☐ A. 1:13 P.M.
- ☐ B. 1:54 P.M.
- ☐ C. 1:58 P.M.
- ☐ D. 2:34 P.M.

22. Which graph represents a relationship of direct variation?

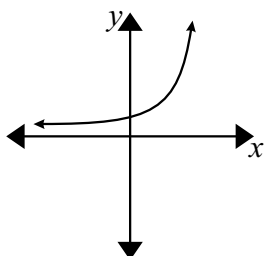
O A.



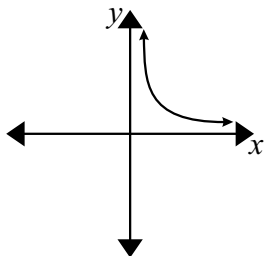
O B.



O C.



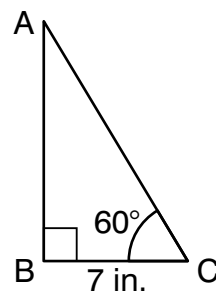
O D.



23. Susie is playing a game. At each turn she rolls two number cubes, each with sides numbered 1 through 6. Then she adds the numbers she rolled. What is the probability that on her next turn she will roll a sum of 4?

- O A. $\frac{2}{36}$
 O B. $\frac{3}{36}$
 O C. $\frac{4}{36}$
 O D. $\frac{6}{36}$

Use the diagram below to answer question 24.



24. To the nearest 0.1 inch, what is the length of \overline{AB} ?

- O A. 3.5 in.
 O B. 9.9 in.
 O C. 12.1 in.
 O D. 14.0 in.

25. Imagine a monetary system in which the only paper bills available are worth \$81, \$27, \$9, \$3, and \$1. What is the fewest number of bills that could be used to pay a bill of \$275 exactly?

- O A. 5
 O B. 7
 O C. 9
 O D. 12

26. Dave's Electronics is having a sale on radios. Each day the price of every radio will be reduced 5% from the previous day's price. If the price of a radio before the sale was \$50, which expression can be used to find its price on the n th day of the sale?

- O A. $50 - 0.05n$
 O B. $50 - 50n(0.95n)$
 O C. $50(0.05)^n$
 O D. $50(1 - 0.05)^n$

Use the equation below to answer question 27.

$$y = (n - 1)(n)(n + 1)$$

where n is a whole number greater than 1

27. Which of the following must be true about the value of y in the equation above?

- ☐ A. y is a multiple of 4
- ☐ B. y is a multiple of 5
- ☐ C. y is a multiple of 6
- ☐ D. y is a multiple of 7

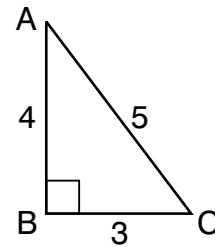
28. Which of the following **cannot** be modeled by a linear equation?

- ☐ A. the relationship between the length of a side of a cube and its volume
- ☐ B. the relationship between the diameter of a circle and its circumference
- ☐ C. the relationship between equivalent Celsius and Fahrenheit temperatures
- ☐ D. the relationship between equivalent numbers of feet and meters

29. A new Mainebucks lottery has been created. Each ticket contains three of the ten digits 0, 1, 2, 3, . . . , 9. (A digit can be used more than once on a ticket.) Each arrangement of digits has an equal chance of winning. If Mr. Watson buys one ticket, what are his chances of winning?

- ☐ A. 1 out of 10
- ☐ B. 1 out of 300
- ☐ C. 1 out of 720
- ☐ D. 1 out of 1000

Use the diagram below to answer question 30.



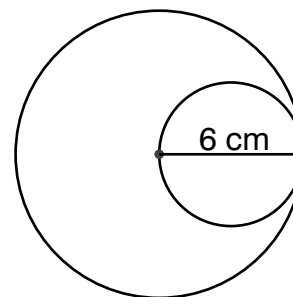
30. In $\triangle ABC$ shown above, what is $\sin A$ equal to?

- ☐ A. $\frac{3}{5}$
- ☐ B. $\frac{3}{4}$
- ☐ C. $\frac{4}{5}$
- ☐ D. $\frac{5}{4}$

31. Five different books are placed side by side on a shelf. In how many different ways could they be arranged?

- ☐ A. 5
- ☐ B. 15
- ☐ C. 25
- ☐ D. 120

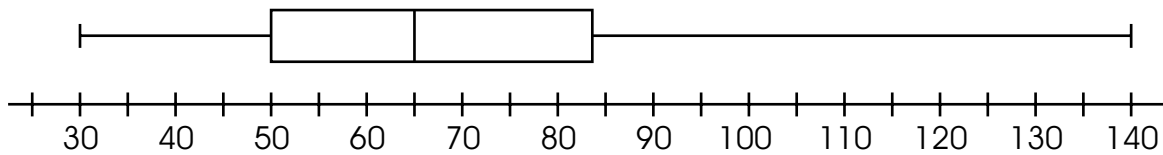
Use the diagram below to answer question 32.



32. The larger circle has a radius of 6 centimeters. What is the ratio of the area of the smaller circle to the area of the larger circle?

- ☐ A. 1:2
- ☐ B. 1:3
- ☐ C. 1:4
- ☐ D. 1:6

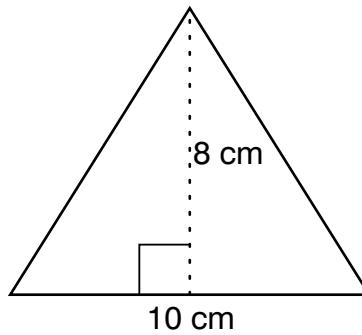
Use the box-and-whisker plot below to answer question 33.



33. What percent of the data represented by the box-and-whisker plot is greater than 65?

- ☐ A. 32%
- ☐ B. 50%
- ☐ C. 68%
- ☐ D. 75%

Use the figure below to answer question 40.



40. a. Find the area of the triangle above.
- b. Suppose the base of the triangle above is increased by 10% and the height is decreased by 10%. What is the ratio of the area of the new triangle to that of the original triangle? Show or explain how you found your answer.
- c. Consider any triangle with a base, b , and a height, h . Suppose the base of the triangle is increased by 10% and the height is decreased by 10%. Will the ratio of the area of the new triangle to that of the original triangle remain the same for all values of b and h ? Justify your answer mathematically.

40.

Use the table below to answer question 41.

Country	1997 Population (in millions)	Estimated 2002 Population (in millions)
China	1221.6	1272.3
India	967.6	1042.3
United States	268.0	279.5
Indonesia	209.8	225.6

41. This table shows the 1997 and estimated 2002 populations of the four most populous countries in the world. Jessica and Katy are using the data for a presentation of their world geography report.
- Jessica says that between 1997 and 2002 the population of China increased faster than that of the United States. Katy insists that the United States population increased more quickly. Explain how **each** of them can be correct. Justify your answer mathematically.
 - Suppose the table was extended for additional 5-year periods (2007, 2012, 2017, etc.). If the population of the United States continues to grow at the percentage rate that is predicted in this table, after how many 5-year periods will the population reach 300 million? Show or explain how you found your answer.

41.

Visual and Performing Arts

Released Items

1. Select a craft (such as pottery, weaving, basketry, or wood arts) and explain how it can give us insight into the development of a culture. Give at least two examples to support your answer.

1.

2. Explain how scientific and technological advances have influenced sets, lighting, sound, or costumes in the theater. Provide at least three examples that show the influence of scientific and technological advances in theater.

2.